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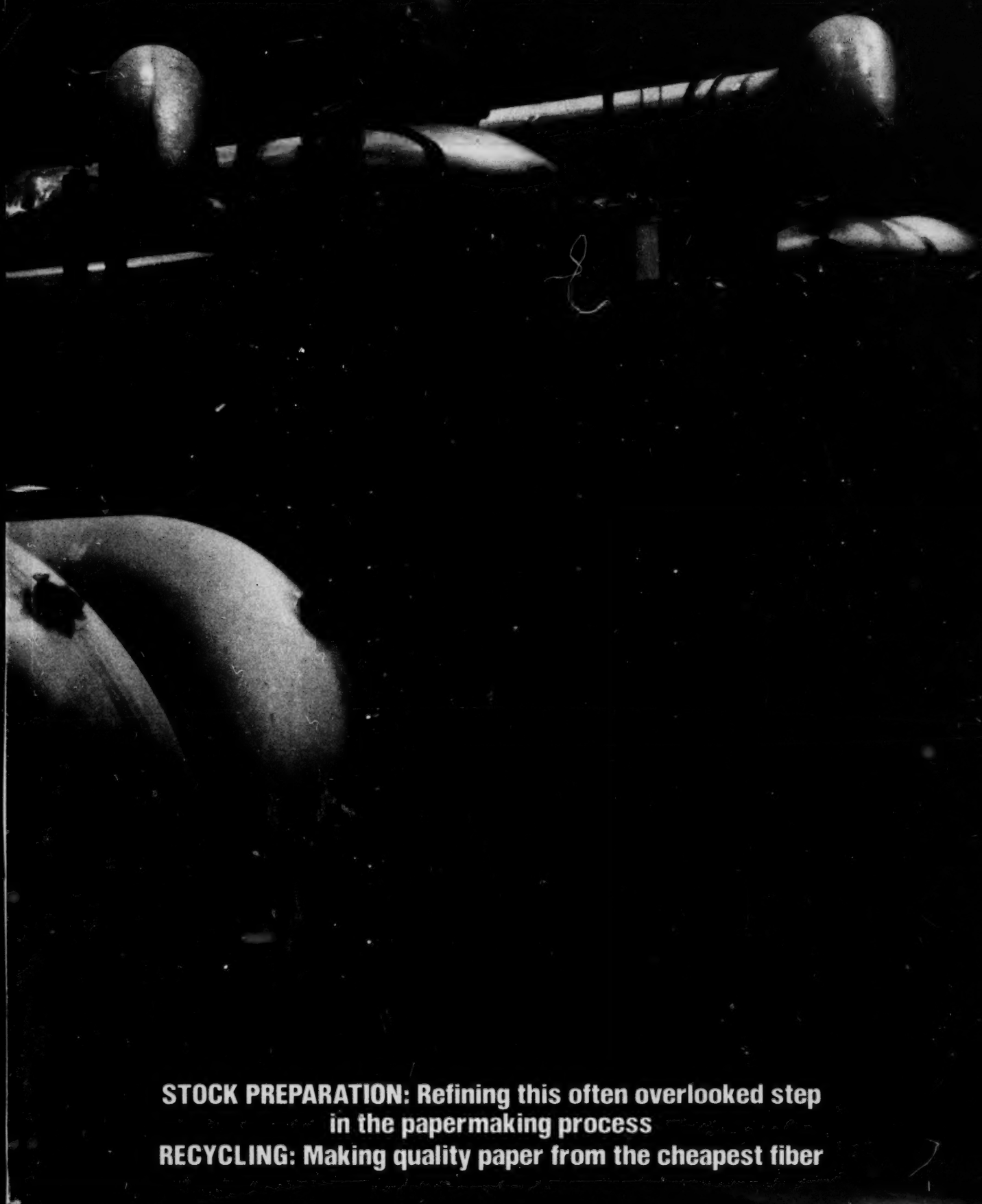
PULP & PAPER

March 1985



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Number 3

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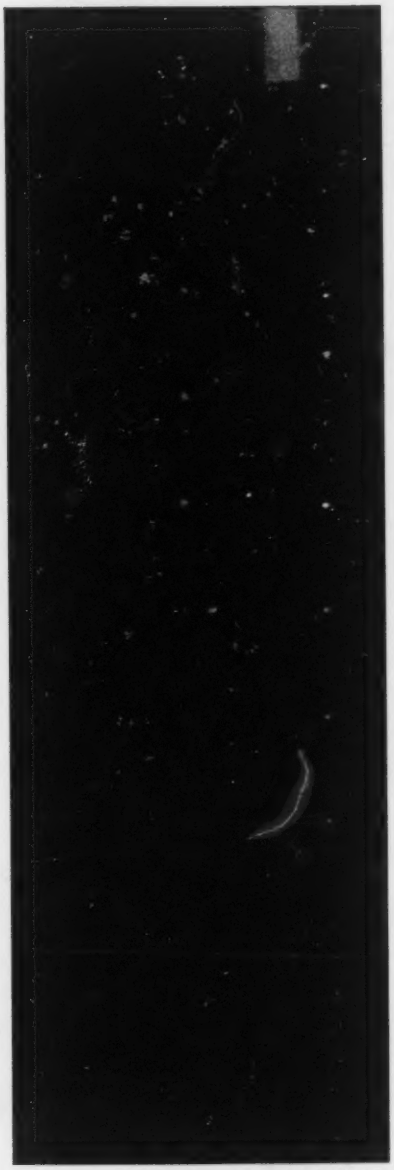

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Fine paper machine cleaners illustrate stock preparation, highlighted in this month's issue along with the closely related area of refining. **(Staff photo by Ken Smith.)**

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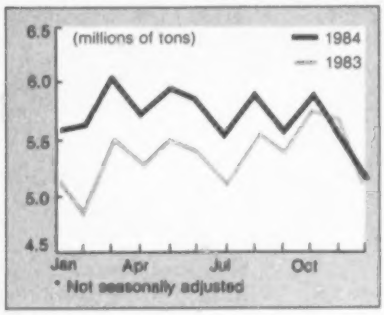
U.S. paper and board production, 1984/83



December production of U.S. paper and paperboard maintained the pace recorded in November and October, said the American Paper Institute. The average of November and December seasonally adjusted rates was 68.2 million tpy, while the 1984 total was a record 68.8 million tons. This is 5.8% over the 1983 high. Output of paper and paperboard each came to 34.4 million tons, a 4.8% increase over 1983 for paper and 6.8% more for paperboard.

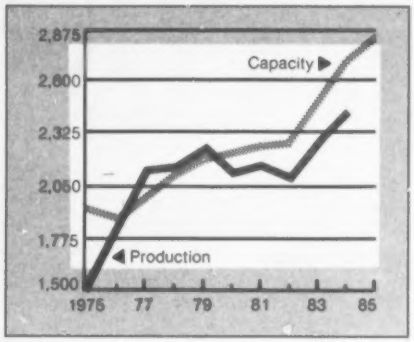
Among major grades, demand for coated paper remained strong throughout 1984. Production of coated paper reached a record 6.2 million tons, 9.2% above 1983 and about 97% of total capacity. Although production of printings/writings slowed toward the end of last year, the total output of 18.4 million tons was 5.8% above 1983's total. Production of packaging and industrial papers held up well in December. Output of unbleached kraft in 1984 was 3.7 million tons, equal to 1983's total.

Canadian newsprint shipments in December rose nearly 7% over December 1983 to 772,000 metric tons, according to the Canadian Pulp & Paper Assn. Newsprint mills operated at a 92% rate, up from 88% in November and equal to December 1983. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Dec.	429	1.2	5,543	7.3
Uncoated groundwood (s)	Dec.	115	−8.7	1,566	2.3
Coated paper (s)	Dec.	498	4.6	6,221	9.2
Uncoated free sheet (s)	Dec.	695	−1.3	9,150	4.4
Other printing/writing	Dec.	110	2.8	1,461	5.0
Total packaging and other paper (s)	Dec.	386	0.3	5,551	1.0
Tissue	Dec.	420	9.1	4,921	2.8
Total paper	**Dec.**	**2,653**	**−0.7**	**34,412**	**4.8**
Unbleached kraft paperboard	Dec.	1,154	1.9	16,032	6.9
Semichemical medium	Dec.	392	2.1	5,162	9.1
Bleached paperboard	Dec.	305	−0.7	4,059	3.4
Recycled paperboard	Dec.	575	1.2	7,971	7.7
Total paperboard	**Dec.**	**2,503**	**1.6**	**34,372**	**6.8**
Total U.S. paper and paperboard output	**Dec.**	**5,155**	**0.4**	**68,784**	**5.8**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Nov.	4,502	−3.1	55,857	5.8
Market pulp production	Nov.	579	−1.0	6,872	5.0
Wastepaper consumption at paper/board mills	Nov.	1,310	4.0	15,847	8.5
Pulpwood consumption (cords)	Nov.	7,153	−1.6	88,114	2.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Dec.	19.496	−1.4	268.100†	6.2
Containerboard inventories at U.S. box plants and mills	Dec. 1	2,632	9.0		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Nov.	909	6.4	10,646	25.8
Imports of Canadian newsprint	Nov.	N/A	N/A	N/A†	N/A
U.S. paper exports (including products)	Nov.	299	−26.0	4,372	−3.4
Exports of unbleached kraft linerboard	Nov.	113	−32.7	1,967	−7.2
Exports of woodpulp	Nov.	274	8.7	3,581	0.7
Norscan pulp inventories[4]	Dec. 31	1,621			
Norscan pulp operating rates[4]	Dec.	90%	96%	91%	88%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Dec.	772	6.9	9,034†	7.0
Operating rates		92%	88%	92%	85%
Inventories held by U.S. consumers	Dec. 31	1,342	13.8		
Other paper/board shipments	Dec.	220	−3.5	2,757	7.1
Woodpulp shipments (export only)	Dec.	590	−17.6	6,703†	−1.4
Operating rates	Dec.	81%	86%	86%	86%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1983	1984	1985e
Production[1]	2,278	2,526	2,664
Capacity[2]	2,473	2,704	2,849
Utilization rate	92.1%	93.4%	93.5%
Imports	25	45	45
Exports	45	41	45
Apparent U.S. consumption	2,258	2,530	2,664
lb/capita	19.35	21.49	22.40
GNP ratio	1.47	1.55	1.58

1. P&P estimate.
2. API capacity survey.
e = Estimate.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Scott Paper[1]	525	18.4
2. Westvaco	420	14.7
3. Champion Intl.	360	12.6
4. Mead	300	10.5
5. Consolidated	205	7.2
6. Potlatch[2]	170	6.0
7. Midtec Paper	140	4.9
8. Simpson Paper	123	4.3
9. Newton Falls	100	3.5
10. Boise Cascade	54	1.9

1. S.D. Warren Div.
2. Northwest Div.

Market share of top five companies:
63.5%

Market share of top ten companies:
84.1%

Total U.S. capacity (1985):
2.849 million short tons

COATED FREE SHEET: Strong demand should last

Grade structure: Coated free-sheet papers contain no more than 10% groundwood pulp, with the balance being chemical pulp. Coated Nos. 1 and 2 have no groundwood content at all; No. 3 may contain none or only small amounts. About half of all No. 4 coated paper has enough groundwood content to be excluded from the coated free-sheet category, while the rest has 10% or less groundwood.

Basis weights for Nos. 1 and 2 are generally between 60 lb and 100 lb, while Nos. 3 and 4 are generally in the 45- to 90-lb area. Most coated free sheet is used by commercial printers, although nearly a fifth of No. 3 goes into books and magazines. Annual reports and promotional material are the major end-uses, other than publications, for coated free sheet.

Coated paper comes in finishes that include glossy, dull, matte, and embossed. Magazine paper tends to be glossy, while dull and matte as well as glossy are used for book and commercial printing end-uses. Embossed tends to be used for fancy printing jobs and makes up less than 2% of shipments in any grade.

Glossy paper is considered to have a gloss level of 45 or more on the Gardner gloss meter. The gloss level of dull paper can be as low as 25, and matte is 20 or below. One U.S. industry survey in the early 1980s reportedly showed that about 65% of all coated-two-side No. 1 used was glossy and 35% was dull, with a small balance left for matte and embossed. For No. 2, the spread went to 80% and 16% for glossy and dull, respectively. For No. 3, it was about 63% glossy, 3% dull, and 33% matte. The majority of the 375,000 tpy of coated-one-side paper is free sheet.

Production/capacity: Coated free-sheet shipments in the U.S. climbed faster than coated groundwood in 1984, rising at a double-digit pace. The fastest growing area of the coated paper industry was No. 4 group, where both free sheet and groundwood mills compete—shipments there jumped by 16% last year, according to one estimate. Other free-sheet grades were up by at least 10%. By contrast, capacity rose by 9.3%, according to American Paper Institute figures. Thus, operating rates increased over 1983 levels and mills basically ran full-out through 1984.

API estimates the industry will add 125,000 tons of capacity in 1985 by mill improvements, and 20,000 tons through new machines, which is assumed to represent Scott Paper Co.'s Skowhegan, Maine, machine.

No major new U.S capacity is expected before late 1986, when International Paper Co. has indicated it may bring on 175,000 tons of new capacity somewhere, probably in the South. Westvaco Corp. is expected to up capacity by a net 150,000 tons by the end of 1988, with a similar boost coming in the following five years.

Outlook: No sign of real weakness had appeared in coated free-sheet markets in early 1985, although some mills did remove restrictive allocations for some grades at the end of 1984-85's annual report season. Demand is expected to roughly keep pace with capacity growth, holding operating rates above 93% at least through 1985.

Prices: Prices rose about as fast as demand in 1984, and discounts were not seen. Quotes increased by 9% to 13%, December-to-December, on average. Typical pricing trends ($/short ton, average price for year) are as follows for 70-lb No. 1 sheets: 1978, $880; 1979, $939; 1980, $1,021; 1981, $1,096; 1982, $1,148; 1983, $1,213; 1984, $1,321. For 60-lb No. 3 rolls: 1978, $621; 1979, $690; 1980, $750; 1981, $798; 1982, $798; 1983, $830; 1984, $919.

Markets: By far the largest share of coated free sheet goes into commercial printing. By one estimate, percentages sold directly to commercial printers, by grade, are as follows: Nos. 1 and 2, 95%; No. 3, 78%; No. 4, 48%. The second biggest market for No. 4 coated is magazines (35% of all No. 4 shipments). More than 80% of all coated-one-side paper goes to label and wrap manufacturers. ■

(News section continues on page 25)

SALES AND EARNINGS

White paper market boosted profits in '84

High demand for coated publication papers led a strong market for papers in 1984, allowing companies to post "record high" sales. But depressed conditions in the timber and wood products industry forced many companies to write off past and projected losses in this sector. Earnings for the fourth quarter were especially affected by such write-downs.

Sales in fourth quarter 1984 for 29 U.S. paper companies were $15.5 billion, up 12.7% from 1983; earnings of $1.4 billion were up 140%. For 1984 as a whole, sales of 28 companies totaled $57.7 billion, an increase of 14.3%; net earnings of $2.7 billion were up 44.9%. (All earnings figures are after-tax income from continuing operations.)

The acquisition of St. Regis Corp. by Champion International Corp. in late 1984 created the nation's largest paper company and the second largest producer of lumber/plywood. Including contributions from St. Regis, 1984 sales of the new Champion Corp. were $5.1 billion, 37.4% below the combined 1983 sales of the two companies. In 1984, Champion's premerger business segments had an operating income of $232 million, up 50% over 1983.

International Paper Co. reported a net loss for 1984's fourth quarter of $74 million, due to a pretax charge of approximately $150 million to cover anticipated losses from the sale or closure of wood products manufacturing facilities and expected losses on West Coast timber leases. Sales were $4.4 billion (down 7% from 1983), and net income was $120 million (down 53%).

Great Northern Nekoosa Corp., a major newsprint, groundwood, and free-sheet business papers producer, recorded its highest sales ever at $1.9 billion and its highest earnings ever at $120 million.

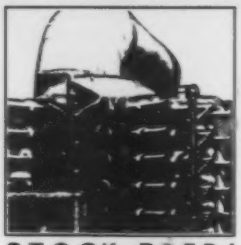
Reported 1984 sales for Georgia-Pacific Corp. were $6.7 billion, up 11% from 1983. G-P's earnings, at $253 million, showed a stunning increase of 237%.

Temple-Inland Inc. may be the only firm to report record earnings in its building products segment. T-I's sales in 1984 were $1.3 billion and earnings were $103 million, up 113% over 1983. ■

U.S. paper/forest products results.

	Full year ($000)			
Paper companies	**Sales**	**Change 1984/83**	**Earnings[1]**	**Change 1984/83**
Boise Cascade	$3,816,850	10.6%	$124,800[2]	106.7%
Bowater Inc.	881,855	15.8	62,541	57.9
Champion International[3]	5,121,089	20.1	139,032[2]	69.2
Chesapeake	350,237	27.9	22,133	161.3
Consolidated	686,328	19.3	80,588	64.5
Crown Zellerbach	3,094,500	15.0	86,900[2]	−1.0
Federal Paper	637,450	12.0	37,075[2]	197.6
Fort Howard Paper	1,338,588	−70.3	133,076	24.4
Georgia-Pacific	6,682,000	10.6	253,000[2]	237.3
Great Northern Nekoosa	1,873,000	19.7	120,000	42.9
Hammermill	1,854,991	14.3	55,894	71.7
International Paper	4,700,000	6.8	120,000[2]	−52.9
Kimberly-Clark	3,616,200	10.4	217,500[2]	15.2
Longview (10/31)[4]	483,005	29.4	22,183	28.1
Louisiana-Pacific	1,230,000	11.6	22,700[2]	−1.7
Mead	2,720,200	14.9	139,300	227.0
Pentair	545,438	70.8	21,245	78.3
Pope & Talbot	320,799	14.5	(558)	n.m.
Potlatch	993,910	9.6	49,631	22.6
Scott	2,847,300	15.5	187,021	51.2
Jefferson Smurfit	678,112	13.1	24,504	141.6
Sonoco Products	740,869	10.8	42,535	26.8
Southwest Forest	777,394	22.2	14,042[2]	n.m.
Temple-Inland	1,262,900	7.4	102,700	113.1
Union Camp	1,973,781	16.9	181,451	36.7
Westvaco (10/31)[4]	1,776,267	18.3	129,974	107.0
Weyerhaeuser	5,549,738	13.7	270,187[2]	31.9
Willamette	1,181,910	13.0	66,221[2]	263.9
Total	**$57,734,711**	**14.3%**	**$2,725,675**	**44.9%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. **Boise Cascade**: 1984 net excludes effects of $88 million pretax charge taken to restructure building products segment. **Bowater**: 1984 net exludes $11.0 million gain from discontinued operations. **Champion**: 1984 net excludes after-tax writeoff of $150 million for restructuring building products business and $5 million gain from St. Regis acquisition. **Crown Zellerbach**: 1984 results include pretax charge of $30.1 million to cover losses on timber cutting contracts and to restucture timber and wood products operations. **Federal**: 1984 net excludes $1.4 million gain from settlement of lawsuit. **Georgia-Pacific**: 1984 net income excludes $160 million after-tax charge from disposal of discontinued operations; 1984 net includes pretax gain of $19 million from sale of a building; 1983 net includes pretax charges of $135 million for the year and $67 million for the quarter from the writedown of assets and a pretax gain of $38 million for the year on settlement of a contract dispute. 1983 results restated by company to reflect discontinued operations. **International Paper**: 1984 net includes a pretax writeoff of $163 million to cover anticipated losses from the sale or closure of certain wood products facilities and expected losses on West Coast timber leases. 1983 net includes pretax gains of $123.7 million from land sale and sale of timber. **Kimberly-Clark**: 1984 net excludes $7.4 million gain from exchange of debt. **Louisiana-Pacific**: Yearly income figures exclude effects of extraordinary items in both years. Fourth-quarter 1984 net includes pretax gains of $23.5 million from sale of timberlands and $33.6 million from the sale of National Gypsum Co. common stock. **Scott**: 1983 sales restated to reflect accounting change. **Southwest Forest**: 1984 net excludes fourth-quarter after-tax charge of $10.0 million relating to federal timber contract buybacks. **Weyerhaeuser**: 1984 net excludes $44.0 million after-tax charge from writedown of closed and curtailed facilities and nonoperable contracts. **Willamette**: 1984 net excludes $5.2 million after-tax charge for termination of federal timber contracts.
3. Data includes St. Regis operations, 60% for Oct. and Nov., 100% for Dec.
4. Fiscal year is not calendar year; date indicates last quarterly report.
( ) = loss. n.m. = Not meaningful.



STOCK PREP/
RECYCLING

Waste-to-energy incineration plants may cut future wastepaper supplies

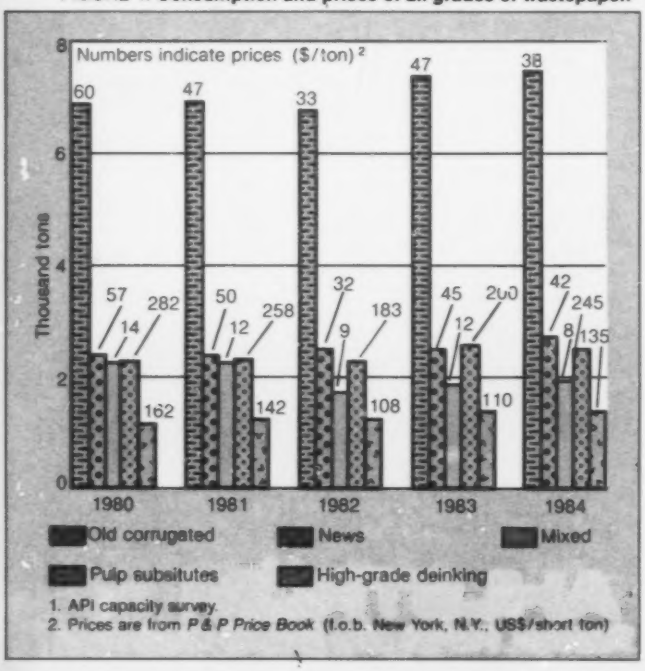
P&P survey finds the growing number of waste-disposal methods and unfavorable government regulation potentially threatening to recyclers

By MICHAEL J. DUCEY, Technical Editor

■ Secondary fiber mills may face a serious threat to their raw material source later in this decade. The threat comes from the unprecedented growth of waste-to-energy and other mass-incineration facilities planned for construction in major metropolitan areas throughout the 1980s. Growing with the number of these plants is the number of governmental forces that regulate municipal solid waste (MSW) stream components, direction, and, to some extent, end uses.

To put together this report on the latest developments in alternative waste disposal methods, on both national and regional fronts, *Pulp & Paper* took a survey, which included all 50 states, on the progress of "resource recovery." Comments on the subject were provided by industry associations, mills, and executives who are actively pursuing an agreement with public officials.

FIGURE 1: **Consumption and prices of all grades of wastepaper.**[1]



1. API capacity survey.
2. Prices are from *P & P Price Book* (f.o.b. New York, N.Y.; US$/short ton)

WASTEPAPER CONSUMPTION. A brief overview of wastepaper use in the industry is shown in Table 1. Paper is separated from MSW at source separation centers, at transfer stations, or by the individual solid waste generator (commercial, residential, etc). The latter method accounts for the largest amount of recovered material. Several thousand recycling centers, public and private, are currently in operation in the U.S., while some 300 separate collection programs have been active since 1980.

Currently, the supply of wastepaper seems to be constant, but rapid changes in demand can cause wide fluctuations in price. Recovery is labor-intensive, and cost varies with the region (and with supply). Figure 1 examines the price history of different grades. Prices tend to fluctuate around economic conditions and will continue to do so in the future. One major factor in the consumption and price of wastepaper is the price of market pulp. Cheap market pulp lowers consumption of wastepaper as mills can afford to use more virgin fiber. But as secondary fiber is incorporated into a product line, particularly in the production of newsprint, the price stabilizes. Exports of wastepaper also influence the market as they are expected to grow strongly in the next five years.

WASTE-TO-ENERGY. Mass incineration of solid waste has been a disposal option for both private and public sectors since the early 1920s. Air pollution had been the major deterrent to constructing such facilities and was the reason for closing down many of them in the 1960s. The resource recovery facilities of today are all equipped to handle pollution (as required by law), but their problems are confounded by a number of other factors, such as operational safety, "scaling-up" engineering problems, lack of guaranteed fuel supply, financing, and government influences.

Many types of resource recovery facilities are in operation today. Mass incineration is most popular, having larger plants that can be used for MSW volume reduction and/or energy conversion. Two prevalent types of mass incineration are refractory-lined furnaces (usually for

TABLE 1: **Survey results showing resource recovery situation, by state.**

State	Operating resource recovery plants	Total wastepaper burned (tpd)	Future plants[1]	Recycling paper mills[2]	Mills' wastepaper consumption (tpd)	Does plan address recycling?[3]	Year statewide plan was enacted	Statewide plans[4]	Number of enacted flow control laws[5]	Towns with operating plants
Ala.	2	350	6	4	700	Y	80	RR	2	Huntsville, Tuscaloosa
Alaska	1	25	2	0	0	Y	81	N	0	Sitka
Ark.	3	200	10	1	125	Y		RR	0	Batesville, No. Little Rock, Osceola
Ariz.	0	0	1	2	300	Y	81	N	2	
Calif.	1	100	19	12	2,550	N			3	Susanville
Colo.	0	0	2	0	0	Y		N	1	
Conn.	1	125	9	6	900	P	85	RR	1	Windham
Del.	1	1,000	3	0	0	Y		Y	0	Wilmington
Fla.	5	5,400	10	1	100	Y	81	Y	7	Dade, Lakeland, Mayport, Pinellas, Pompano Beach
Ga.	0	0	1	4	875	Y	81	Y	Statewide	
Hawaii	0	0	1	0	0	Y	78	RR	1	
Idaho	1	50	5	0	0	Y		RR	1	Burley
Ill.	1	1,250	4	7	1,140	N			0	Chicago
Ind.	0	0	2	4	1,025	Y		RR	0	
Iowa	1	180	2	1	50	Y	80	Y	1	Ames
Kans.	0	0	1	1	30	Y	80	E	1	
Ky.	0	0	9	1	225	Y		RR	0	
La.	1	650	1	3	405	Y		EN	0	New Orleans
Mass.	3	1,620	12	4	400	P		RR	1	Saugus, Braintree, Pittsfield
Maine	1	170	7	1	150	Y		EN	0	Lewiston
Mich.	0	0	6	8	1,395	Y	78	RR	0	
Minn.	2	122	11	1	330	P		Y	3	Cottageville, Red Wing
Mo.	1	75	2	3	255	Y	80	Y	1	Ft. Wood
Miss.	1	150	5	3	273	Y		RR	0	Pascagoula
Mont.	1	70	2	0	0	Y		RR	0	Livingston
Md.	2	3,100	4	0	0	Y	85		1	Baltimore, Timonium
N.C.	1	200	5	0	0	Y		Y	2	Wilmington
N. Dak.	0	0	1	0	0	Y		N	0	
Nebr.	0	0	0	0	0	Y	82	Y	0	
Nev.	0	0	1	0	0	N		Y	1	
N.H.	3	324	10	2	110	Y	82	RR	0	Durham, Groveton, Portsmouth
N.J.	0	0	12	5	1,200	Y	79	RR	0	
N. Mex.	0	0	0	0	0	N			0	
N.Y.	8	8,500	12	15	1,666	N		N	10	Albany, Cuba, Glen Cove, Hempstead, New York City, Niagara Falls
Ohio	2	2,000	4	12	2,072	N		N	1	Columbus, Gahanna
Okla.	2	900	3	5	630	Y	84	N	1	Miami, Oklahoma City
Ore.	0	0	2	3	870	Y	83	D	2	
Pa.	1	520	6	8	1,050	Y		RR	4	Harrisburg
R.I.	0	0	1	0	0	Y	74	RR	0	
S.C.	1	50	3	0	0	N			0	Johnsonville
S. Dak.	0	0	1	0	0	Y		N	0	
Tenn.	4	810	6	4	525	Y		N	0	Dyersburg, Gallatin, Lewisburg, Nashville
Texas	3	100	12	5	835	Y	80	RR	0	Gatesville, Palestine, Waxahachie
Utah	0	0	2	0	0	N		N	0	
Va.	6	920	12	5	800	Y	82	Y	1	Salem, Portsmouth, Norfolk, Ft. Eustis, Harrisonburg
Vt.	0	0	4	2	45	Y		V	0	
Wash.	0	0	1	1	65	Y	81	Y	2	
Wis.	2	390	6	15	2,135	Y	81	Y	0	Madison, Waukesha
W. Va.	0	0	2	0	0	P		RR	0	
Wyo.	0	0	0	0	0	Y		N	0	

1. Projected through 1990.
2. Includes all mills consuming recycled paper.
3. Includes all enacted solid waste management plans, laws, or regulations. P=pending.
4. Y=yes; N=no; RR=plan addresses resource recovery only; E=exempt; EN=exclusion; D=disclaimer; V=voluntary.
5. Through either the municipality, county, or special waste district.

volume reduction only, but they can be retrofit for energy conversion with a waste-heat boiler affixed downstream) and water wall-lined furnaces, where heat transfer occurs with circulating water running through tubes along the furnace walls.

Refuse-derived fuels (RDF) are made in processes involving separators (for metals and other noncombustibles) and shredders for void volume reduction. These fuels are classified as fluff, densified/pelletized, wet, or powdered and are stored until fed to waste-heat recovery boilers. Modular waste-disposal units usually operate in two stages (separating and burning) and are applicable to small-scale processing (less than 200 tpd). New technology in this field is on the horizon, with methods of pyrolysis, chemical reduction, and fluidized beds receiving more attention.

Such facilities are initiated by the public sector because of a problem with an existing MSW system and/or an opportunity to profit from the situation (i.e., waste-to-energy). For example, New York City has recently moved forward with a plan to construct five incineration plants and to divert, by the year 1990, some 4 million annual tons (about half the city's total) of MSW away from the Staten Island landfill, which has only 15 functioning years remaining. Other reasons for building plants include available markets for the energy recovered (which would displace other higher-cost energy sources), such as industrial process steam, space/area heating, electricity generation, and mechanical energy conversion. *P&P*'s survey of the states found landfill problems in densely populated areas to be the chief incentive for construction. However, many of our respondents indicated that space heating, particularly for prisons and universities, is a popular use for these plants.

Sometimes the groups that finance projects dictate the final use to which the plants are put. Usually projects are financed either by general obligation bonds or through industrial revenue bonds issued by a government body (state, municipality, or special district). The public agency associated with the government body presiding over the project provides a guarantee to supply the facility with MSW over a long period of time. Contracts are arranged with trash collectors (public or private) who pay a "tipping fee" to dump MSW. Having established these contracts, the agency must then seek and obtain a long-term buyer for the energy recovered (again through contracts). As more MSW is received by the facility, more tipping fees are collected, more energy is produced, and the security of the bondholders is increased. Therefore, there may be an incentive to build oversize plants, making it difficult for other users of MSW to obtain raw materials, such as recyclable paper.

The recent income tax reform movement is posing a new financing obstacle for private corporations wishing to participate in the construction, ownership, and partnership of waste-to-energy plants. Under the Treasury Dept. plan, companies that build and operate these plants in partnership with local governing bodies would lose a host of tax breaks, including investment tax credits, five-year straight-line depreciation on most equipment, and accelerated depreciation on energy-generating gear. Perhaps the most important potential loss is the Treasury Dept.'s plan to reduce the tax-free status of industrial development bonds, thus increasing the cost of borrowing money to fund the construction and operation of a facility.

Another more tangible consequence of alternative disposal methods is operational safety. These plants have a record of many operation interruptions due to accidents. RDF plants seem to be more complex in handling MSW and, therefore, have more opportunities for accidents. An accident happened recently at an Akron, Ohio, plant, where a mixture of sawdust laced with toluene, xylene, and methyl ethyl ketone found its way into the shredder house and was ignited by a spark. A recent survey of RDF plant shutdowns revealed that the major cause for operation interruption was explosions (14%). Table 2 illustrates the plants' construction activity and operating records.

FLOW CONTROL OF SOLID WASTE. The agencies involved with solid waste control are branches of state and local government that deal with the question of solid waste management. Some states have their own solid waste authority, while others come under the jurisdiction of government departments such as natural resources, environmental protection or management, and health. The beginnings of flow control legislation for the solid waste stream quite often pass through these offices on their way to the elected officials. All along the route are financiers who lobby to obtain guaranteed control of the MSW, assuring its direction to the waste-to-energy plant. These efforts are a major concern of recyclers, who must themselves lobby to combat "air-tight" flow control.

In 1976, the federal government passed the Resource Conservation & Recovery Act (RCRA). The major provision in the act required states to submit solid waste management plans and addressed the recycling industry by "encouraging proven resource recovery technology." States complying with the law were to have plans by 1985, and *P&P*'s survey revealed that 42 had enacted or had pending statewide plans. These plans vary from state to state both in addressing resource recovery (particularly recycling) and in implementing statewide initiatives on a local level (Table 3). Most states have simply divided the federal money to accommodate local establishment of the plans, appointing a state office to oversee the local plans.

A state has many options in its approach to flow control. These include authorizing locally enacted control measures, requiring a state agency to authorize flow control, requiring local flow control, and defining ownership rights of MSW. If the state plan is too vague in areas such as the definition of solid waste or the goals of resource recovery, then problems can arise with the local plans dealing with MSW and resource recovery facilities. The American Paper Institute has sanctioned ten states (Georgia, Iowa, Kansas, Louisiana, Minnesota, North Carolina, Texas, Virginia, Washington, and Wisconsin) where the state solid waste acts have adequate language protecting recyclable material. These are mostly in the form of exemptions for reusable materials found in the waste stream.

One new approach is being tried in the East. New Jersey has introduced legislation mandating source separation at the original generating point in hopes of bolstering individual recycling efforts and curtailing flow control confrontations. The bill is being scheduled for a mid-1985 vote.

Flow control is achieved using either regulatory control or economic control. The first method allows the

municipality to collect and dispose of its own trash, thus ensuring complete control. The municipality can enter into contracts with private haulers to collect and dispose of all or a portion of the trash at designated sites. The municipality can also use its permitting and licensing powers to require private haulers to deliver MSW to a designated site. Economic control is implemented by reducing tipping fees at desirable disposal sites, thus enticing haulers to deliver to those points. The same effect could be achieved by increasing tipping fees at existing sites, such as landfills.

LEGAL RAMIFICATIONS. The well-known case of Hyman Budoff, a trash hauler/source separator in Akron, Ohio, who sued the city of Akron because of its ordinance directing the entire MSW stream to the local waste-to-energy facility, is now in its fourth year of litigation. The plaintiff charged that the ordinance is in direct violation of the Sherman Anti-Trust Act, as a restraint of trade, and of the Commerce Clause of the U.S. Constitution, as unlawful seizure of property without just compensation. The city of Akron argued that an ordinance of this type is exempt from antitrust laws under the "state action" exemption. The city further argued that it was exercising proper police authority and was only inhibiting commerce, not seizing property. The latest development in this case occurred on Aug. 24, 1984, when the U.S. Court of Appeals for the Sixth Circuit—for the second time—upheld the Federal District Court's ruling that the city was immune from antitrust laws because of the broad authority Ohio cities have in regulating garbage services, together with the expressed powers of the state agency financing the facility. This ruling amounts to a clear endorsement of the state's right to monopolistic behavior in this situation.

In another case involving this question of exemption from federal antitrust (*Community Communications Inc. v. the City of Boulder, Colo.*), the same court held that a municipality can be liable for antitrust unless it is acting under the auspices of a state policy permitting such a restraint of trade. Thus, it seems that any flow-control ordinance of this type would not be effective unless it had state recognition and support under the state's own solid waste law or guidelines.

Also, the federal government is considering legislation providing for a "municipal action exemption," which would allow local governments to enact ordinances that undermine federal laws, particularly with regard to antitrust. Another consideration is the question of "home rule," a concept practiced by 30 states that allows municipalities to supersede state and federal legislation on antitrust unless expressly prohibited by state law (the Ohio case is awaiting a second hearing by the U.S. Supreme Court). Table 2 shows the activity of flow control within the states; note that as states move toward waste-to-energy and other disposal options, more legislative action is necessary. Table 4 shows that guaranteeing a MSW supply is common among the larger plants.

PAPER INDUSTRY POSITION. A number of executives in the paper industry are actively requesting that each state modify its solid waste management acts to directly address recyclable material. The most effective modification would be a clear exemption of recyclables from MSW at the generating or transfer points. This would allow the free market to operate inside any ordinance involving flow control unless Congress decides to enact a municipal action exemption.

TABLE 2: **MSW guarantees by facility size.**

Design capacity (tpd)	Plants in size group	Waste guarantee (%)
0 to 200	52	53.8
201 to 500	27	66.7
501 to 1,000	17	82.4
1,001+	31	87.1

TABLE 3: **Breakdown of resource recovery plants by type and activity data.**

	Type of plant			
	Mass-incineration	RDF	Modular	Total
Existing	32	22	29	83
Under construction	24	8	9	41
Planned	67	17	40	124
Operating efficiency (%)	93	73	84	82
Unplanned shutdowns (%)	47	64	39	52
Average tipping fee ($)	17.7	12.05	10.72	13.49

It should be noted that the paper industry supports waste-to-energy plants as a viable resource for future energy needs. In fact, one observer mentioned that recycling is usually promoted by solid waste managers until they realize that recycling by itself will not solve the problem. Then incineration is proposed, and the real question becomes one of how much incineration is needed.

To answer this question, governments tend to hire consultants to analyze the MSW stream and its components. Papermakers who use recycled papers do the same for their areas to determine the quality of the recyclable paper. Both entities usually find that eliminating paper from the MSW going to an incinerator does not significantly reduce the energy content of the fuel. In a study done for Garden State Paper Co. Inc. on the compatibility of recycled newsprint production and MSW incineration/energy conversion, it was concluded that at recycling rates of 25% and 50%, the Btu output of a plant operating without newsprint recycling vs one with recycling differed only 3.5% and 7.0%, respectively. And when the energy required to produce newsprint from virgin fibers (referred to as the life cycle energy balance) is accounted for, the energy savings dramatically offset the losses incurred by removing newsprint from the waste-to-energy facility.

To summarize the paper industry's position, we must take a closer look at today's recycling laws. API notes that 1984 was a record year for paper collection (10% more than in 1983), reuse, and export. Demand increased for two reasons: increased recycled paper production and increased private consumption (such as small-scale burning for steam production), which encouraged more collection. These reasons hold true for the past two decades during which collection has increased two-fold without the help of government intervention. Changing the laws may only hamper these activities instead of protecting the free market system, which has begun to create new uses and technologies for these vast resources. ■

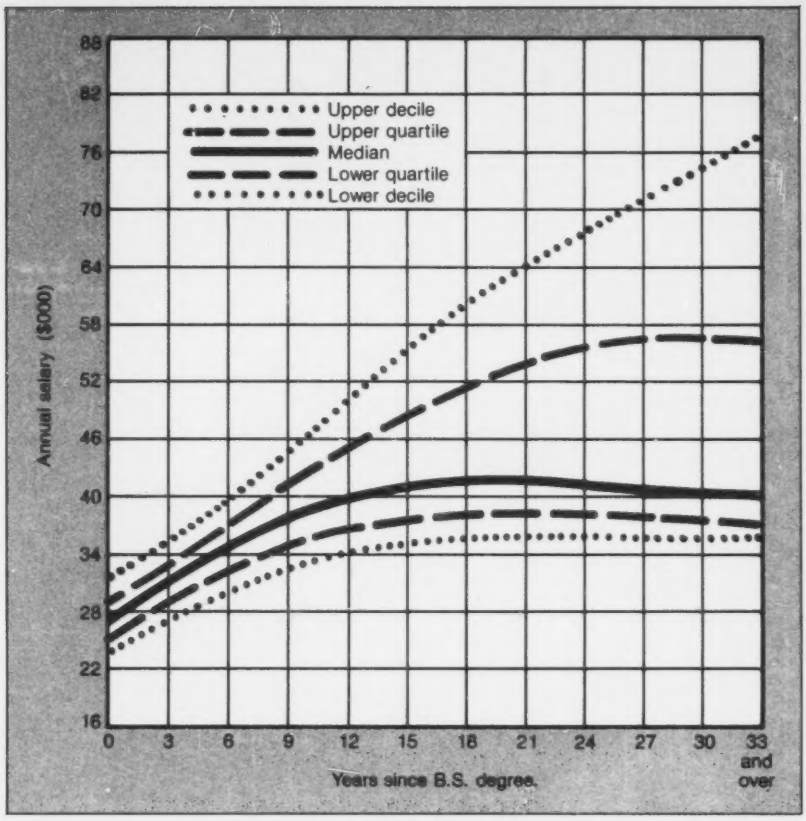


FIGURE 1: **Annual salary of engineers in the paper industry since B.S. degree.**

Paper industry salary increases

By DEBORAH S. SOLLOSI, Staff Editor

TABLE 1: **Engineers' median salaries by industry group.**

Industry	1984 salary	1983 salary	% change
Petroleum	44,850	44,650	0.4
R & D	44,700	42,250	5.8
Mining	41,650	38,850	7.2
Paper	40,000	38,650*	3.5
Chemical	39,750	37,350	6.4
Computer	39,650	n/a	—
Aerospace	38,900	36,900	5.4
Design, consulting and engineering	38,550	36,800	4.8
Construction	38,000	37,200	2.2
Lumber and wood products	38,000	38,650*	−1.7
Local government	37,400	32,250	16.0
Electronic equipment	36,250	33,300	8.9
Metal industries	35,950	32,700	9.9
Electric	35,050	34,400	1.9
Mechanical	34,300	34,900	−1.7
State government	30,500	28,750	6.1
Federal government	29,900	38,150	−21.6
Average	37,200	36,000	3.4

*Figures for the paper industry and forest products industry were combined in the 1983 survey. The 1984 survey treats the two industries as two separate categories.

Source: Engineering Manpower Commission.

■ Engineers in the paper industry were paid a median salary of $40,000 in 1984, up a modest 3.5% from 1983 salaries, and slightly below the 4.6% inflation rate for the period. Paper industry engineers' median salaries still exceeded the average median for 16 major industry groups, however, estimated at $37,850, according to a survey by the Engineering Manpower Commission of the American Assn. of Engineering Societies.

The commission's report, which is published yearly, surveyed more than 650 organizations, representing about 93,000 engineers. Questionnaires were mailed in February 1984, and the salaries reported were in effect Feb. 1, 1984. The computer industry was added as a new group in the 1984 survey.

The 1984 median salary for paper industry engineers ranked fourth when compared with the 16 major industry groups listed in Table 1, and the 3.5% rise over last year's median salary for the paper industry is on a par with the 3.4% average 1984 increase for the groups listed. Salary increases for other industry groups range from a 16% hike for engineers in local government to an actual decline of 21.6% for federal government engineers. Altogether, three groups showed decreases in median salaries paid, with mechanical engineers and lumber and wood products engineers' salaries both dropping 1.7%.

Salaries paid to all types of engineers in the paper industry are presented in Figure 1, which plots annual salary against the number of years after receiving a bache-

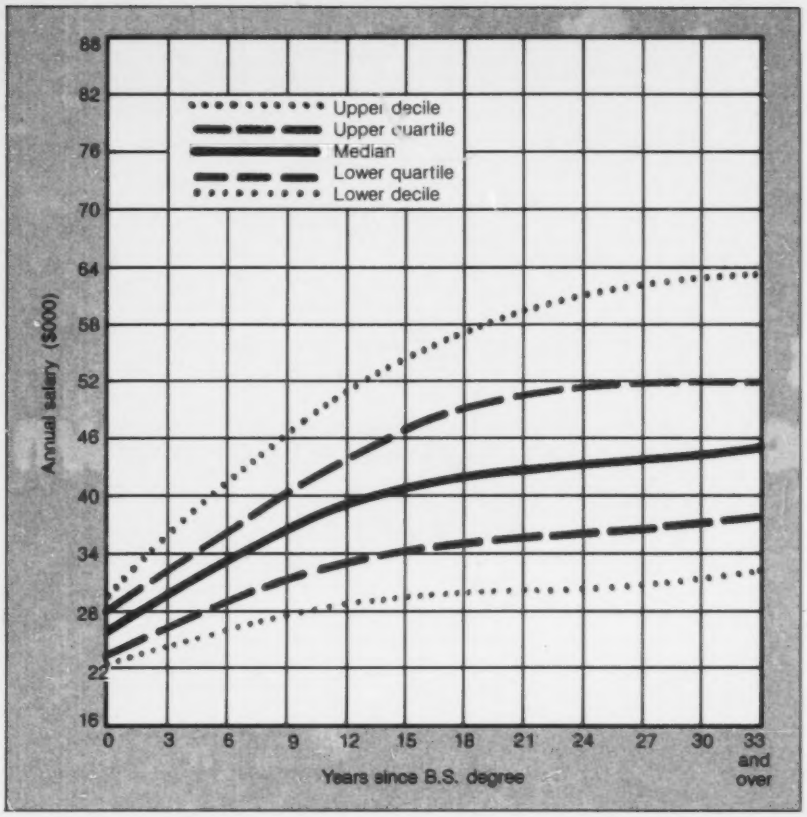


FIGURE 2: **Annual salary of engineers in all industries since B.S. degree.**

outpaced by 4.6% inflation in 1984

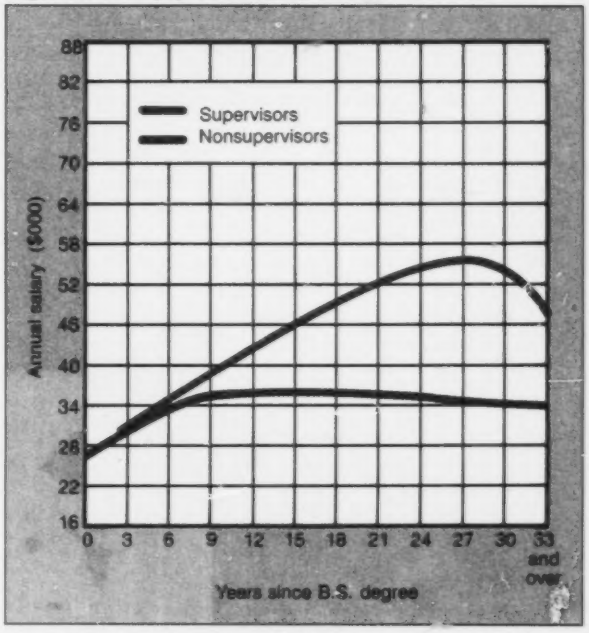
lor of science degree. For comparison, annual salaries of all industry engineers are plotted in Figure 2. In 1984, newly employed engineers in the paper industry earned a starting salary ranging from $23,950 to $31,050, with a median starting salary of $27,000.

Although experience affects salaries, annual compounded rates decrease as experience increases. Higher percentage increases go to less experienced engineers, resulting in salary compression between starting and experienced engineers. This is true for engineers in all industries (Figure 2) as well as for those in the paper industry (Figure 1). It is especially true for those in nonsupervisory positions (Figure 3).

Differences in salary exist for many reasons other than years of experience, and these factors must also be taken into account. For example, data on all engineering categories show that engineers in supervisory positions earned considerably more than those in nonsupervisory positions. In the paper industry, median salaries paid to supervisory engineers average out to $43,100, while median salaries paid to nonsupervisory engineers average out to 33,800.

Salaries also fluctuate with geographic region. The difference between median salaries paid (for all engineers) in the west-south-central region, where salaries are the highest ($41,350), and the east-north-central and south-Atlantic regions, where median salaries are the lowest ($36,900 for both) is $4,450, compared to a spread of $8,650 between the high and low regions in 1983. ■

FIGURE 3: **Median salaries of supervisory vs nonsupervisory engineers in the paper industries, 1984.**



Complete salary data are published in *Professional Income of Engineers—1984*, from the Engineering Manpower Commission of American Assn. of Engineering Societies, 345 East 47th St., N.Y., N.Y. 10017. Price: $45 for members; $75 for nonmembers.

Slow capacity growth should keep

But uncertainties include impact of the strong dollar on exports, plastic invasion of the grocery sack market, and customers' new quality needs

By WILLARD E. MIES, Executive News Editor

■ Despite recent market weakness, the U.S. linerboard and corrugating medium market should be relatively tight over the next couple of years because of limited capacity growth, according to several speakers at the First International Unbleached Kraft Conference.

But some concerns expressed by speakers at the meeting, sponsored by *Pulp & Paper* and *Pulp & Paper International* last November in New York City, included the continuing impact of the strong U.S. dollar on liner exports, the plastic invasion of the kraft grocery sack market, and faster than expected incremental capacity growth caused by installation of high-intensity presses and other improvements in technology.

New market requirements facing the industry were also discussed, including the need for lower-cost containerboard and boxes, improved compression strength, and better quality graphics. But some disagreement still existed over box specifications in the proposed alternate to Rule 41, which tries to incorporate some of these changing market needs.

LIMITED NEW CAPACITY. The most striking factor about the U.S. linerboard market outlook is the very limited additions to new capacity which are projected through 1987, said Thomas P. Clephane, a principal in Morgan Stanley & Co. Inc. While long-term capacity growth since the mid-1960s has been between 3% and 3.5% annually, the latest American Paper Institute survey shows capacity additions rising at only a 1.2% annual rate for the 1982-87 period.

A number of major linerboard expansion projects have been deferred or postponed due to recent low profitability in the industry, decisions by certain companies to buy assets rather than build, and the collapse of profits from timber and wood products, he noted.

With the limited capacity growth, Clephane looks for relatively high linerboard operating rates over the next two years and improving industry profitability. He projected linerboard demand would rise 1.2% in 1985 and 3% next year based on about 2% growth in box shipments each year. He forecast linerboard export shipments would rise about 5% in 1985, followed by a 7% increase in 1986.

This would result in an industry operating rate of 96.5% in 1985, rising to 98.2% in 1986 (Table 1). "It is unlikely that we could produce a set of circumstances, outside of a very deep recession, that would drop the operating rate over the next two years to under 94%," he noted.

Corrugating medium should also be in relatively tight supply over the next two years, according to Clark S. Johnson, executive vice president, Virginia Fibre Corp. He cited forecasts by Copeland Economics showing corrugated box shipments rising by 3.3% in 1985 and then declining by 3.5% in 1986 as the economy enters a recession.

He noted that Copeland is forecasting semichemical medium production of 5.28 million tons this year, which would be up about 2.5% from last year, followed by a 2.9% decline to 5.13 million tons in 1986. This would result in operating rates of 101% in 1985, followed by a slight decline in 1986.

Clark predicted that medium is "destined to play an increasingly important role in providing the needed top-to-bottom compression of a corrugated box. This will probably come from heavier weights of medium as linerboard facing weights decrease."

GREENFIELD VS INCREMENTAL EXPANSION. The cost of building a greenfield linerboard mill vs upgrading an existing mill was discussed by Ron Aurell, president, Jaakko Pöyry International Inc. and Richard L. Trueb, president of Pöyry-Bek Inc.

Trueb estimated that the average capital cost for building a new state-of-the-art 350,000-tpy linerboard mill is currently about $275,000/daily ton. This is lower than the cost in the late 1970s and early 1980s due to the impact of new technology, recent competitive pricing for equipment and construction, and the fact that the estimate is for a less than super-scale mill.

An accumulation of recent small technological innovations offer "attractive, and to a major extent, untapped productivity gains and cost reduction opportunities not only in older mills but in mills built more recently," Trueb noted. These include high-intensity pressing, improvements in pulp mill energy economics, and methods to de-bottleneck and extend recovery cycle capacities. He presented several examples of incremental expansion projects at existing mills of various

liner market tight

ages ranging in cost from $108,000 to $165,000/daily ton. The return on such modernization projects is attractive in the current economic environment.

Trueb speculated that several 300,000-tpy-size linerboard mills may be built in the U.S. South in the late 1980s by either independent firms or European producers. Some of the "super-mill" plans postponed by major U.S. integrated producers may be "dusted off" and implemented in the early 1990s, he commented.

Financial strategies for companies thinking about building new mills or acquiring existing assets were discussed by Donald P. Brennan, managing director of Morgan Stanley & Co. Inc. and a former industry executive. He noted that during the 1978-83 period, capital spending by the forest products industry had "significantly outweighed" the industry's ability to generate cash.

This has caused forest products companies to turn heavily to capital markets, particularly debt financing. Debt has been a costly financing alternative because of the "unprecedented" level of real interest rates in recent years, he noted. With the difference between inflation and interest rates currently about 8% to 9% vs only about 2% in 1978, financial decisions are crucially important for a company's success.

Forest products firms have also been increasingly turning to merger and acquisition activity as a source of external financing. Total financing activity during the 1978-84 period equaled $20.7 billion, of which mergers and acquisitions represented $14.7 billion, debt $3.8 billion, and equity $2.2 billion. Most of the equity activity ($1.1 billion) took place during the 1983 stock market surge, he said.

CHANGING QUALITY REQUIREMENTS. A number of economic, marketplace, and regulatory forces are changing future performance requirements for containerboard and boxes, according to Victor A. Casebolt, vice president and group executive, International Paper Co. Some of the major quality trends noted by Casebolt and other speakers are as follows.

• Containers are being stacked higher and higher on pallets in warehouses and this is creating a need for boxes with greater top-to-bottom compression strength. At the same time, a shift from metal cans and glass bottles to flexible plastic in primary packaging is placing greater demand on corrugated containers for stacking strength. Cole Rowland, vice president of Phillip Townsend Associates, a Houston, Texas-based consulting firm, described how a shift to plastic in motor oil and paint packaging has placed new demands on corrugated.

One response of manufacturers has been to develop new high-strength boards using stronger medium and lighter-weight linerboard to produce boxes with greater stacking strength, Casebolt said. International Paper has introduced a board (HercuCorr) which uses thermosetting polymers to achieve greater strength and moisture resistance.

• Higher-quality graphics are being required for corrugated containers for use in point-of-purchase displays. One survey found that 21% of container plant managers are using color coating and more than 50% said they would be likely to use preprinted linerboard in several years, Casebolt noted.

• Cost pressures at the converting level are creating the need for new technology such as the continuous-run corrugators. Such corrugators, which can run at speeds up to 820 to 1,000 fpm (compared with around 650 fpm previously) are creating the need for higher-performance containerboard.

According to James F. Stevenson, president of SAS International Inc., a consulting firm based in Cincinnati, Ohio, higher speeds have affected containerboard quality requirements in three major areas: (1) moisture uniformity requirements have tightened as higher speeds have reduced the moisture changing capacity of the corrugator; (2) tolerance to mechanical defects in roll quality that can cause web breaks is reduced; (3) bonding of liners to medium must take place faster.

He said that a couple of major integrated U.S. companies have already made substantial progress toward achieving moisture uniformity, and a significant number of U.S. mills would have the necessary technology by late 1985 or early 1986. While there is no universal industry standard, an 8% moisture level is best for both boxmaker and paper mill, according to Stevenson.

• Containerboard represents about half the cost of making a box, and the need to reduce cost is resulting in the increased use of secondary fiber, hardwood furnish, and lower basis weights. Although there are no new mills being built to use virgin fiber, Temple-Inland is building a recycled liner mill in Ontario, Calif., and In-

TABLE 1: **U.S. linerboard industry forecast, 1983-88, (000 short tons) (Source: Morgan Stanley & Co.)**

	1983	1984e	1985e	1988e
Production	15,001	15,950	16,135	16,615
% change	11.17	6.33	1.16	2.97
Exports	2,255	2,150	2,250	2,400
% change	19.57	−4.66	4.65	6.67
Production for U.S.	12,746	13,800	13,885	14,215
% change	9.80	8.27	0.62	2.38
Inventory change	−117	40	−150	−100
U.S. consumption	12,863	13,760	14,035	14,315
% change	9.87	6.97	2.00	2.00
Box shipments				
% change	7.4	7.0	2.0	2.0
Real GNP				
% change	3.7	6.8	2.9	2.5
Federal Reserve Board production index				
% change	6.6	10.9	3.4	2.5
Capacity*	16,217	16,488	16,723	16,914
% change	1.15	1.67	1.43	1.14
Operating rate (%)	92.50	96.74	96.48	98.23

*Based on American Paper Institute November 1984 survey. e=Estimate.

ternational Paper Co. has acquired an idle recycled containerboard mill in Riegelsville, Pa., Casebolt noted. He said the capital cost for a new recycled mill is only about 60% that of a virgin mill.

Stevenson noted that outside the U.S., most inside liner and much of the corrugating medium are made from 100% recycled fiber. Although about 60% of the containerboard consumed in the U.S. is kraft, nonintegrated European box plants appear to be using kraft for only about 25% of their containerboard requirements.

He also noted a trend—most advanced in parts of the world where fiber costs are high—to reduce combined board basis weight. "It's common in the U.S. to use 121 lb of fiber/1,000 ft² for applications successfully packaged and shipped in Europe with 94 lb/1,000 ft²."

DISAGREEMENT ON RULE 41. Reductions in basis weight in the U.S. are restricted by Rule 41 and Item 222 governing box specifications for rail and truck shipment. The speakers disagreed on the current proposed changes to these rules.

"The alternate Rule 41 is no longer a dream of the future but is ready to go today," said William O. Kroeschell, director of product technology, Stone Container Corp. Permits have been granted for the use of the alternate rule by the National Motor Freight Classification Board. The Uniform Freight Classification Committee of the Railroads has said that it will issue permits to any shipper requesting them for test shipments under the proposed rule, he noted.

The moves "legitimize" a trend in the market toward increased emphasis on compression to increase box stacking strength, Kroeschell said. Among other things, the alternate rule would use edge crush values for the first time to measure the compression strength of corrugated, reduce bursting strength requirements to 80% of their previous level, and make a few minor changes in the gross weight limits of some containers.

The alternate rule does not specifically change the weight of facings. In the future, however, the rules may be changed so that basis weight requirements would be eliminated and measurements placed on a performance basis, he said in response to a question.

"Edge crush is a powerful measure of the quality of liner and medium," Kroeschell stated. "Accompanying improved compression will be an improvement in the properties of linerboard determined by good fiber bonding, such as printability, resistance to score cracking and scuffing, and strong glued joints and closures."

Casebolt charged that the proposed changes are not market-driven but only serve the perceived needs of producers to reduce cost. While the logic behind the edge crush test is sound, he said the specifications for it have been set so low "that almost any box produced in the U.S. today can meet the specifications easily." Not only would bursting strength be reduced by 20%, but stacking strength would be lowered by 17% to 25%. "Therefore, what is proposed is lower performance, not higher," he said.

INNOVATIVE NEW MACHINE. Chesapeake Corp. is installing the first high-speed fourdrinier machine in North America to use multi-ply forming technology in the production of linerboard, according to Garland Edmonds, vice president, production. The machine, scheduled to start up later this year, is designed to achieve higher board uniformity and quality while permitting greater flexibility in the use of fiber furnish.

The 3,000-fpm Voith Duoformer K machine will be capable of running at 3,000 fpm and initially will produce 900 tpd of liner (from 26 to 90 lb/1,000 ft²), with provision for expansion to 1,200 tpd incorporated in the original design. The entire process from stock preparation through roll finishing will be computerized using the latest distributed control technology, Edmonds noted.

The machine design includes three individually formed plies using four wires, a highly loaded Bi-Nip press, and a third wide-nip Flex-O-Nip press capable of 6,000 pli. The three-ply sheet provides the ability to independently form and control the properties of each sheet.

Some advantages of this approach include improved formation, high fines retention, good ply bond and printability, better control of fiber orientation and basis weight, and the ability to choose the furnish for each ply. Tensile, burst, and ring crush test for the three-ply sheet should be significantly higher than for a single-ply sheet, Edmonds said.

LINERBOARD EXPORT OUTLOOK. U.S. linerboard exports showed a slight decline in 1984 because of the strong dollar, higher returns for producers in the domestic market, and slower economic growth in most overseas markets, according to Leo Schenker, executive vice president of Central National-Gottesman Inc. Exports declined from about 2.1 million short tons in 1983 to slightly more than 2.0 million tons in 1984 but should then rebound to nearly 2.2 million tons this year.

While exports to Europe, Latin America, Africa, and the Middle East will remain relatively stable or increase slightly over the next few years, Schenker expects a "very substantial" increase in U.S. shipments to the Pacific Rim. The share of U.S. kraft liner exports taken by Pacific Rim countries is expected to rise from 13% in 1978 to more than 35% by this year. In comparison, western Europe is expected to take only about 30% of total U.S. liner exports in 1985.

Scandinavian and European mills are shipping most of their kraft linerboard production into western Europe, where they have a current cost advantage over U.S. producers. In addition, the production of recycled containerboard within the EEC countries has in-

TABLE 2: **Supply/demand for liner in western Europe, 1982-1986—mottled included. (000 metric tons) (Source: ASSI Kraftliner.)**

	1982	1983	1984*	1985*	1986*
Corrugated board production	9,740	10,010	10,410	10,830	10,610
Kraft liner share (%)	27.0	27.0	26.5	26.0	26.0
Kraft liner consumption	2,630	2,700	2,760	2,820	2,760
Inventory change (estimate)	−70	+80	+50	−100	−50
Kraft liner apparent consumption	2,560	2,780	2,810	2,720	2,710
Kraft liner domestic supply	1,780	1,830	1,960	1,990	2,020
Import requirements to western Europe	780	950	850	730	690

*Forecast.

creased from 5.2 million metric tons in 1983 to 6.3 million tons in 1984. "This means that whatever is left after usage of test liner and western European kraft liner has to be shared by the U.S., Canada, eastern Europe, and a number of new producers like Brazil and South Africa," Schenker said.

European per capita consumption of corrugated board is only about half that of the U.S., even in countries where income is roughly comparable, noted Bengt Hamrefors, general manager and CEO of ASSI Kraftliner in Sweden. This is due to a different distribution system in Europe, shorter shipping distances, higher cost of corrugated, and less-stringent freight rules.

For some of the same reasons, there has been a "very clear tendency" away from virgin materials like kraft liner and semichemical medium to recycled fiber in Europe, Hamrefors said. Kraft linerboard's share has declined from 28.0% of the western European corrugated board market in 1982 to an estimated 26.5% in 1984 and may drop to about 26.0% in 1985-86.

European box shipments are projected by ASSI to rise close to 4% in both 1984 and 1985 before declining to about 2% in 1986. Linerboard consumption will show somewhat slower growth because of the increasing share of the market taken by recycled board. Scandinavian and European producers will capture a larger share of the available kraft liner market, with import requirements declining each year from 950,000 metric tons in 1983 to an estimated 850,000 tons in 1984 and then to 690,000 tons in 1986 (Table 2).

LOW-COST PRODUCER. The strong rise in the dollar has dramatically changed the cost-competitive position of southern U.S. and Swedish kraft linerboard producers over the past two to three years, according to Fred D. Iannazzi, president, Andover International Associates, a Danver, Mass.-based consulting firm.

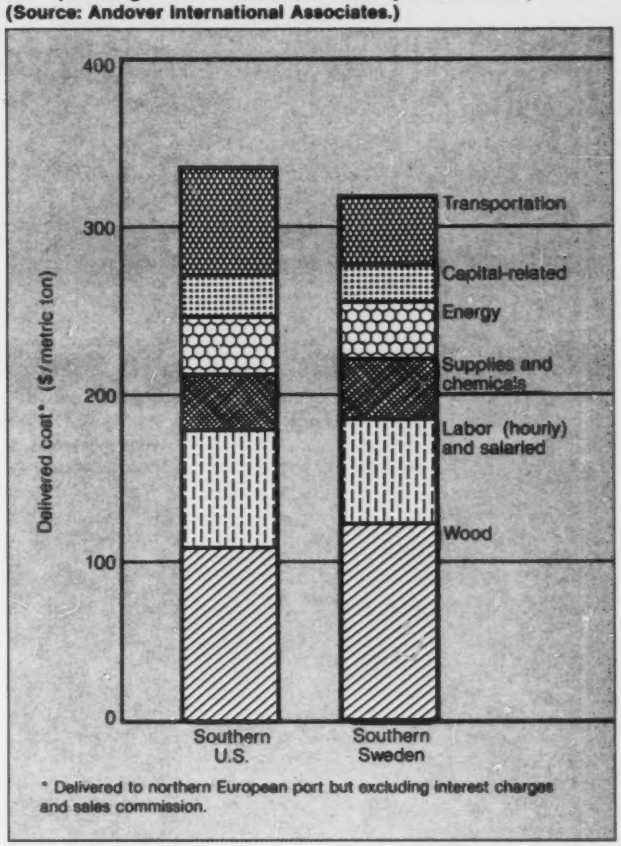
"In 1981, the U.S. South was the low-cost producer and supplier of linerboard to the European market," he noted. "Higher distribution costs partially reduced some of the U.S. cost advantage, but our significantly lower pulpwood costs more than compensated for Sweden's lower distribution cost in reaching European markets."

But between the latter part of 1980 and November 1984, the Swedish krona has lost about half of its value against the U.S. dollar. The impact of this dramatic shift in exchange rates can be seen in comparative pulpwood costs in the U.S. South and Sweden. In 1980, the U.S. South had a cost advantage of $69/metric ton of pulpwood, but this advantage had deteriorated to zero by May 1984. "Since then, Swedish pulpwood producers raised their prices by 20% last August, and the South has regained a slight cost advantage, but it is significantly less than in the past," Iannazzi said (Figure 1).

FUTURE OF CANADIAN INDUSTRY. The future of the Canadian containerboard and kraft paper industry in a declining tariff environment was discussed by Paul R. Bannerman, president of Etcan Ltd., a Montreal, Que.-based paper sales agency.

Until 1980, a 15% tariff wall protected the containerboard and kraft paper industry in Canada and selling prices reflected this tariff protection. Under GATT negotiations completed in the late 1970s, the Canadian government and a "somewhat reluctant industry" agreed to stage reductions in these tariffs, he noted. By 1987, unbleached kraft paper will have no duty protection, kraft liner will have only 6.5% protection, and corrugating medium a 4% tariff.

FIGURE 1: **Cost comparison for kraft linerboard, third quarter 1984. (Exchange rate = 8.1 Swedish krona per U.S. dollar.) (Source: Andover International Associates.)**



These reductions have been "extremely painful" for the Canadian industry since its cost structure is not competitive with that of U.S. producers due to longer growing cycles and higher wood harvesting costs. In addition, most mills in eastern Canada were designed to serve the smaller Canadian market and were not built on an economic scale, he noted.

Bannerman said he doubted that another kraft linerboard mill would be built in Canada and that there may well be some shrinkage of existing capacity over the next decade. Whatever capacity is added will be recycled, which currently accounts for about slightly more than 50% of Canada's liner capacity vs only about 2% in the U.S. He predicted that Canadian liner output would grow at a 2% annual rate for the remainder of the 1980s vs 2.9% for the previous decade, which in turn was only half the rate of the 1960s.

KRAFT PAPER MARKET SHRINKING. The reshaping of the unbleached kraft paper industry that began in the late 1970s will continue, marked by further machine conversions, shutdowns, and acquisitions, according to Thomas Ryan, conference cochairman and kraft industry consultant based in Westwood, N.J.

The kraft grocery bag and sack market has grown into the single largest end use for unbleached kraft paper at about 2.2 million tons in 1984. Manufacturing kraft grocery paper and converted bags, however, has been a

low-margin business due to the concentrated buying power of major supermarket chains and the tendency of linerboard mills to swing production into this market in periods of weak demand. There is also increasing competition from plastic bags due to improvements in resin technology and converting methods "which have placed plastic on a toe-to-toe basis with kraft paper economics," Ryan said.

Multiwall is the second largest unbleached kraft paper market at about 880,000 tons in 1984 but is first in the hearts of paper mill managers, according to Ryan. This is mainly due to its higher price, which reflects higher specifications, smaller runs, a wider range of roll widths, and small shipment size. Bulk handling systems have been the largest factor reducing multiwall's market share but should be less of a competitive factor in the future, he said.

COMPETITION FROM PLASTICS. Competition in unbleached kraft paper markets from polyethylene will increase significantly over the next 12 or 18 months, according to Robert E. Bauman, principal, Chem Systems Inc., Tarrytown, N.Y.

Among factors which have increased competition from polyethylene have been the introduction of such new film resins as linear low-density polyethylene (LLDPE) and high-molecular-weight, high-density polyethylene (HMW-HDPE), which permit down-gauging plastic sacks.

The polyethylene industry also suffers from oversupply, which is aggravated by growing exports from feedstock-rich countries such as Canada and Saudi Arabia. Significant new capacity is starting up in Saudi Arabia and Canada in the first quarter of this year. This has contributed to downward pressure on polyethylene prices, with prices for most resins below their 1979-80 level, according to Bauman.

Faced with poor profitability and fairly mature markets, polyethylene producers and fabricators view unbleached kraft markets as an attractive growth area. LDPE and HDPE have already made significant inroads into the retail merchandise bag market. Now the major battlefield is the grocery carryout sack market, which could consume upward of 750 million lb of polyethylene annually if 100% substitution were achieved.

In response to questions, Bauman estimated plastic penetration of the grocery sack market at 8% in 1983, rising to about 10% in 1984, and then to 40% by 1990. Ryan, however, estimated recent penetration at about 6% from an estimated 55 to 65 installed bag lines.

An example of how plastic is invading kraft paper markets was provided by Sharon McDermott, a buyer for J.C. Penney, who said that in 1973 the giant retailer used only paper merchandise bags amounting to about 11,000 tons. By the end of 1984, however, plastic will have accounted for 40% to 45% of Penney's bag requirements, depending on the region. ■

[Editors note: A book containing the complete proceedings from the Unbleached Kraft Conference will soon be available from Pulp & Paper's Book Dept., 500 Howard St., San Francisco, Calif. 94105; (415) 397-1881.]

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RECYCLING: More suppliers meeting individual mill specifications

By MICHAEL DUCEY, Technical Editor

Consumption. A great deal of wastepaper consumers do not use chemicals, particularly those who produce products with no color specifications. Chemicals used in secondary fiber processing are many and vary with the system employed (see Table 1). Surfactants and dispersants have not been represented since many vendors and formulators sell various types and blends of both.

TABLE 1: **1984 consumption of chemicals for the recycled papermaking industry (short tons), as well as current list prices.**

Chemical	Recycling process	All pulp & paper	All industries	1985 price ($/short ton)
Caustic	12,220	2,000,000	11,600,000	$150[1]
Sodium silicate	11,421	12,500	750,000	296[2]
Sodium carbonate	11,750	200,000	8,465,000	120[3]
Hydrogen peroxide	5,000	17,000	137,000	465[4]
Sodium peroxide	5,000	5,000		

1. Liquid, 50%, seller's tanks, Gulf Coast works, f.o.b., freight equalized, 76% Na_2O.
2. Solid or glass, 3.22–3.25 ratio, bulk, 100-lb bags.
3. Dense, 58%, 100-lb bags, f.o.b. works.
4. 35% solution, tanks, freight equalized.

TABLE 2: **Available pulping additives used in recycled papermaking.**

	Phases available	Concentration	Shipped form
Caustic	Liquid	50%	Tanks
	Liquid	73%	Tanks
	Flake	76%	400-lb drum
	Solid	76%	700-lb drum
	Granular	76%	450-lb drum
	Bead	76%	400-lb drum
Chemical action: (1) Adjusts pH and maintains alkalinity. (2) Alkali reacts to saponify the varnish of ink and remove rosin-sizing from fibers.			
Sodium silicate[1]	Solid	3.25	Bulk, 100-lb bags
	Solid	3.25	100-lb bags
	Solid	1.95-2.0	Bulk, 100-lb bags
	Solid	1.95-2.0	100-lb bags
	Liquid	3.22-3.25	55-gal drum
Chemical action: (1) Substitution for caustic and effective at lower pH. (2) Prevents yellowing in deinking of groundwood pulps.			
Sodium metasilicate	Anhydrated	50%	100-lb bags
	Anhydrated	50%	Bulk, 100-lb bags
	Pentanhydrated	20%	100-lb bags
	Pentanhydrated	20%	Bulk, 100-lb bags
Chemical action: (1) Substitution for caustic and effective at lower pH. (2) Prevents yellowing in deinking of groundwood pulps.			
Hydrogen peroxide[2]	Liquid	35%	Tanks
	Liquid	50%	Tankcar
	Liquid	70%	Tankcar
Chemical action: (1) Used to bleach as well as deink (with silicate). (2) Decreases brightness reversion.			
Surfactants			
Nonionic detergent	Liquid	30-100%	55-gal drum
Ionic detergent	Liquid	30-100%	55-gal drum
Dispersants	Liquid	40-100%	55-gal drum
Chemical action: (1) Detergents aid in wetting pigment in inks. (2) Dispersants prevent agglomeration of pigments after separation from fiber.			

1. Ratio of percent SiO_2/percent Na_2O.
2. Similar to sodium peroxide.

The washing/deinking process calls for the addition of chemicals at a repulper. Consuming the greatest amount of chemicals are high deinking grades (colored/uncolored ledger), and the least consuming grades are white shavings, envelope cuttings and other white paper made from chemical pulp. All processes use some chemical to maintain alkalinity to fiberize and separate ink from fiber. Caustic soda is commonly combined with chemicals such as sodium peroxide, soda ash, hydrogen peroxide and/or sodium silicate. Blended surfactants that wet fibers and contaminants and that aid in dispersing are also added into the pulper. Common surfactants employed are nonionic and anionic detergents. Surfactants can be applied alone or are sometimes dissolved in solvent systems, such as aromatics (benzene and toluene derivatives, cetain napthas) and aliphatic hydrocarbons.

Prices. There is a trend developing among suppliers of providing mills with formulations specific to the site conditions (pulping equipment, effluent components, wastepaper grades used, etc.) One well-documented formulation involves low or antifoaming agents which break foam formation quickly, thus avoiding foam problems in the effluent treatment system. Others deal with "stickies," charge aversion, hard water and pitch control. These problem-solving additives are causing incremental price increases as formulators seek to replace cheap diluents like phosphates) with the more effective chemicals.

Surfactant/solvent blends are becoming less prevalent due to mounting environmental concerns of worker safety. These formulations decrease in price with increasing solvent content.

Caustic suppliers see stable prices through 1985, as the chloro-alkyl industry suppresses last year's oversupply scare. Only peroxide capacity seems to be increasing this year as other major producers have not announced any large expansion. It should be noted that producers of surfactants and dispersants often offer many different products and new formulations that generally cost around $1/lb (±$0.25/lb depending on diluent and other additives). ■

NOTE

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